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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

SHECHTMAN, SEAN P

ART UNIT

PAPER NUMBER

2121

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/569,555	Applicant(s) DUBOIS ET AL.	
	Examiner Sean P. Shechtman	Art Unit 2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 April 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 44-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 44-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 February 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the Search Report is not considered to be an information disclosure statement (IDS) complying with 37 CFR 1.98. 37 CFR 1.98(a)(2) requires a legible copy of: (1) each foreign patent; (2) each publication or that portion which caused it to be listed; (3) for each cited pending U.S. application, the application specification including claims, and any drawing of the application, or that portion of the application which caused it to be listed including any claims directed to that portion, unless the cited pending U.S. application is stored in the Image File Wrapper (IFW) system; and (4) all other information, or that portion which caused it to be listed. In addition, each IDS must include a list of all patents, publications, applications, or other information submitted for consideration by the Office (see 37 CFR 1.98(a)(1) and (b)), and MPEP § 609.04(a), subsection I. states, "the list ... must be submitted on a separate paper." Therefore, the references cited in the Search Report have not been considered. Applicant is advised that the date of submission of any item of information or any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the IDS, including all "statement" requirements of 37 CFR 1.97(e). See MPEP § 609.05(a).

2. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a

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separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Specification

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

3. The abstract of the disclosure is objected to because the abstract does not avoid the form and legal phraseology often used in patent claims, such as "means".

Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 44-57 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 44 recites the limitation "the print path" in lines 15-16. There is insufficient antecedent basis for this limitation in the claim. Assumed to be the discrete spatial print path trajectory.

Claim 44 recites the limitation of "establishing a spatial and temporal sequencing law for the print path for said print layers and for said discrete spatial trajectories", however, since "said discrete spatial trajectories" are those of "a plurality of discrete spatial print path trajectories", it is unclear why "said discrete spatial trajectories" are recited as a reason for establishing the spatial and temporal sequencing law since the spatial and temporal sequencing law is already recited as being "for said print layers" which are believed to refer to the plurality of discrete spatial print path trajectories which already includes said discrete spatial trajectories.

Claim 44 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: a three-dimensional arrangement of objects.

Claim 44 is rejected as failing to define the invention in the manner required by 35 U.S.C. 112, second paragraph. The claim(s) are narrative in form (for example, their relative three-dimensional arrangement). The structure which goes to make up the device must be clearly and positively specified. The structure must be organized and correlated in such a manner as to present a complete operative device. Note the format of the claims in the patent(s) cited.

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Claim 46, recites the limitation "said modulation", however there are multiple modulations. Therefore the recitation of "said modulation" in the same or subsequent claim is unclear because it is uncertain which of the modulations was intended (MPEP 2173.05(e)). Assumed to be one of the first or second modulations.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 44, 52, 53, 55, 56 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Pat. No. 6,401,002 to Jang et al (hereinafter referred to as Jang).

Jang teaches the following:

44. A method for producing a three-dimensional multi-material component by the ink-jet-type printing of droplets of at least one material in successive layers (Abstract, Col. 5, lines 45 – Col. 10, lines 24; Fig. 1, 2, 5; Col. 11, lines 1 - Col. 12, line 51, inkjet, droplets, making 3D object), wherein it comprises at least the stages consisting of:

cutting up a representation of the multi-material component into characteristic objects (Fig. 5, Col. 16, line 39 - Col. 20, line 31, triangles);

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slicing the representation of the component into print layers as a function of said characteristic objects (Fig. 5, Col. 16, line 39 - Col. 20, line 31, during “the slicing step, neighboring data points with the same color code on the same layer may be sorted together”, “triangles may be so chosen that each triangle covers one and only one color. In a conventional .STL file, each triangular facet is represented by three vertex points each having three coordinate points, $(x_{sub.1}, y_{sub.1}, z_{sub.1})$, $(x_{sub.2}, y_{sub.2}, z_{sub.2})$, and $(x_{sub.3}, y_{sub.3}, z_{sub.3})$, and a unit normal vector (i, j, k) . Each facet is now further endowed with a color code.);

establishing a plurality of discrete spatial print path trajectories for each print layer (Fig. 5, Col. 7, lines 60 – Col. 8, line 26, motion controlled devices moving relative to one another in an X-Y plane defined by first and second directions (X and Y directions) and in a third direction (Z-direction), controlled by computer system in accordance with CAD-generated data files, “layer data are then converted to machine control languages that can be used to drive the operation of the functional components, including motion devices. These motion devices operate to provide relative translational motion of the material depositing sub-system with respect to the object platform in a horizontal direction within the X-Y plane”; Col. 16, line 39 - Col. 20, line 31, “These segment data are then converted into programmed signals (data for selecting deposition tools and tool paths)”, See also Fig. 5, generate paths for each layer and feedback control to generate path for next layer);

establishing a set of printing parameters as a function of the nature of the materials deposited and the deposition conditions thereof for each print layer and for

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each discrete spatial trajectory (Fig. 5, Col. 7, lines 60 – Col. 8, line 26, eject droplets of correct liquid compositions at desired proportions and rates);

establishing a spatial and temporal sequencing law for the print path for said print layers and for said discrete spatial trajectories as a function of the objects, their relative three-dimensional arrangement and the characteristics of the printer, in order to optimise the process of depositing each print layer (Fig. 5, Col. 7, lines 60 – Col. 8, line 26; Col. 20, lines 10-30, variation in composition represented mathematically within the data package for each layer and used to control the composition of materials deposited; Col. 22, lines 15-35, “creating an image of the object on a computer with the image including a plurality of segments defining the object and with each of the segments being coded with a color defined by the operation of a specific set of selected channels; (e) generating programmed signals corresponding to each of these segments (segments are in space) in a predetermined sequence; (f) operating the pulse generator (actuator means) in response to the programmed signals to activate selected channels; and (g) moving the deposition sub-system and the platform relative to one another in response to the programmed signals”; Col. 25, lines 40-50, generating program signals corresponding to each of the segments in a predetermined sequence, wherein said program signals determine movement in predetermined patterns (spatial) and ejection of droplets of correct rates (temporal), is establishing a spatial and temporal sequencing law for the print path for said print layers and for said discrete spatial trajectories; Fig. 5 shows this is a function of the slicing which is a function of the triangles and their relative three-dimensional arrangement; Fig. 5 also shows this is feedback controlled

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wherein the output of the last layers measured, is characteristics of the printer; Col. 17, lines 23-33, adaptive layer slicing, optimising the process of depositing each print layer).

52. The method according to claim 44, wherein one of the printing parameters is the size and shape of the ejected material droplets, said method consisting in controlling the size and the shape of each droplet of materials to be ejected, as a function of the nature of the materials, the deposition conditions thereof and predetermined print layer thicknesses (Fig. 5, Col. 7, lines 60 – Col. 8, line 26, eject droplets of correct liquid compositions at desired proportions and rates).

53. The method according to claim 44, wherein one of the printing parameters is the temperature of the materials prior to ejection, said method consisting in controlling the temperature of these materials prior to ejection of each droplet, as a function of the nature of these materials and the type of ejection means (Fig. 1, Col. 11, lines 1- Col. 12, line 51).

55. The method according to claim 44, wherein one of the printing parameters is the storage state of the materials, said method consisting in controlling the material state characteristics by controlling the temperature, controlling the pressure and controlling the state of dispersion of the stored materials as a function of their nature in order to optimise the material storage conditions (Fig. 1, Col. 11, lines 1- Col. 12, line 51).

56. The method according to claim 44, wherein one of the printing parameters is the state of the printing environment, said method consisting in controlling the characteristics of the environment in which the multi-material component is produced as

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a function of the nature of the deposited materials (Fig. 1, Col. 11, lines 1- Col. 12, line 51).

Allowable Subject Matter

6. Claims 45, 46-51, 54, 57 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: Referring to claims 45, 46-51, 54, 57, Jang, fails to teach and it would not be obvious to a person of ordinary skill in the art to combine with Jang, a method for producing a three-dimensional multi-material component by the ink-jet-type printing of droplets of at least one material in successive layers having all the claimed features of applicant's instant invention, specifically including:

“wherein the slicing of the representation of the multi-material composite consists in maximising the quantity of materials deposited per print layer”.

“determining a first modulation of discrete spatial print path trajectories for each print layer;determining at least one predetermined direction of discrete spatial print path trajectory for each print layer;determining a second modulation of the discrete spatial print path trajectory from a current layer to the following layer for two successive print layers of the same object, said modulation depending on the number of constituent layers to be deposited for said object in order to optimise the cohesion of the final structure of said multi-material component”.

“wherein the spatial and temporal sequencing law for print path of the print layers and the discrete spatial trajectories comprises a plurality of printing instructions and of successive cleanings of the ejection system”.

“wherein one of the printing parameters is the ejection distance orthogonal to the deposition surface, said method consisting in regulating said ejection distance around nominal values, the nominal values being determined so as to optimise the deposition of the materials on the deposition surface”.

“wherein one of the printing parameters is the degree of obstruction of the ejection system, said method consisting in cleaning the ejection system once the degree of obstruction exceeds a predetermined obstruction threshold value”.

“wherein one of the printing parameters is the power and wavelength of a radiation applied to the deposited materials as a function of the nature of the deposited materials”.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean P. Shechtman whose telephone number is (571)272-3754. The examiner can normally be reached on 9:30am-6:00pm, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SPS

Sean P. Shechtman

June 17, 2009

/Sean P. Shechtman/

Primary Examiner, Art Unit 2121